treatment was necessary to assure an accurate model and to allow efficient calculations. Calculations of the evolution of the sun on or near the main sequence are discussed.

New Neutron Sources of Possible Astrophysical Importance. A. G. W. CAMERON, *Mount Wilson and Palomar Observatories*.—The helium-burning neutron sources previously discussed seem inadequate for heavy-element formation by neutron capture on a slow time scale, owing to the probable small abundances of C^{13} and Ne^{21} following hydrogen thermonuclear reactions in a stellar interior. These convert most of the original C, N, and O nuclei into N^{14} . However, when helium-burning starts, the reactions $N^{14}(\alpha, \gamma)F^{18}(\beta^+ \nu)O^{18}$ and $O^{18}(\alpha, \gamma)Ne^{22}$ should readily take place. Temperatures near 2×10^8 °K are needed to destroy Ne^{22} ; if these should be available near the end of helium-burning, then the reactions $Ne^{22}(\alpha, \gamma)Mg^{26}$ and $Ne^{22}(\alpha, n)Mg^{25}$ should occur with comparable probabilities. The latter reaction is endothermic, but the optimum thermonuclear bombarding energy lies near the neutron emission threshold in the Mg^{26} compound nucleus. Up to 40 neutrons per initial silicon atom in the star may be produced in this way, a number entirely adequate for heavy element synthesis.

The possible role of neutron production in carbon thermonuclear reactions has previously been discussed. It now appears likely that a large rate of energy loss by neutrino-antineutrino pair emission near 10^9 °K (particularly by the Pontecorvo free-free effect and by the neutrino Compton effect) will cause carbon thermonuclear reactions to take place either at very high rates of energy generation or explosively. Two possible sequences of reactions can release a burst of neutrons when partly burned carbon explodes, transforming heavy elements into a new neutron-rich abundance pattern (this may be called neutron capture on an intermediate time scale). Carbon pycnonuclear ignition of a Type I supernova explosion would yield a very strong burst of neutrons which can transform heavy elements into products of neutron capture on a fast time scale. In view of all the neutron sources which now seem possible, it is difficult to predict which stellar objects are responsible for making the heavy elements.

Supported by the Air Force Office of Scientific Research.

Observations of Radio Noise Storms on Jupiter During the 1960 Apparition. T. D. CARR, A. G. SMITH, N. CHATTERTON, AND F. SIX, *University of Florida* AND H. BOLLHAGEN, *Maipú Radio-astronomical Observatory of the University of Chile*.—The radio noise sporadically emitted by Jupiter was

monitored at several frequencies between 10 and 27.6 Mc for approximately six months during the 1960 apparition. Observations were made at the University of Florida Radio Observatory and at the Maipú Radio-astronomical Observatory of the University of Chile. Activity was found to be considerably greater than during the two previous apparitions. Activity was greatest in the vicinity of 18 Mc, and was slight at 27.6 Mc. The principal source is still centered at approximately the same System III longitude that it has occupied during the six previous years for which data are available. The polarization of the radiation at 22.2 Mc was almost always right-handed elliptical at both observatories. The fact that the same polarization sense was observed from stations above and below the geomagnetic equator apparently rules out the possibility that the polarization originates in the terrestrial ionosphere. A noise storm was usually confined to a frequency band a few megacycles wide, but the active band often drifted slowly up or down the spectrum. The spectrum of each pulse making up a storm was usually a few tenths of a megacycle wide. Simultaneous observations at 10 Mc and 20 Mc revealed that noise occurring at these harmonically related frequencies is not correlated. Striking differences in 18-Mc bursts observed simultaneously from Chile and Florida are attributed to scintillations arising in the terrestrial ionosphere. The theory that the radiation arises from the entry of solar particles into Jupiter's magnetic field is being tested by correlating the noise data obtained in Chile at Jovian opposition with the occurrence of solar flares and geomagnetic disturbances.

This work is being sponsored by the National Science Foundation, the Office of Naval Research, and the U.S. Army Office of Ordnance Research.

Lunar Thermal Emission Measurements During the Total Lunar Eclipse of 13 March 1960.

JOHN P. CASTELLI, CARL P. FERIOLI, AND JULES AARONS, *Propagation Sciences Laboratory, Electronics Research Directorate, Air Force Research Division, L. G. Hanscom Field, Bedford, Massachusetts*.—Utilizing the Sagamore Hill Radio Observatory's 84-foot antenna, thermal emission from the moon was measured at 3000 and 1300 Mc during total lunar eclipse of March 13, 1960. Antenna beam angles involved were 18 minutes of arc at 3000 Mc and 38 minutes of arc at 1300 Mc.

For ten hours drift measurements were taken at the rate of five per hour before, during, and after the eclipse. Sky temperature and calibrations were made after each drift. No change in temperature within the 2.5% measureable limits was observed. At 3000 Mc